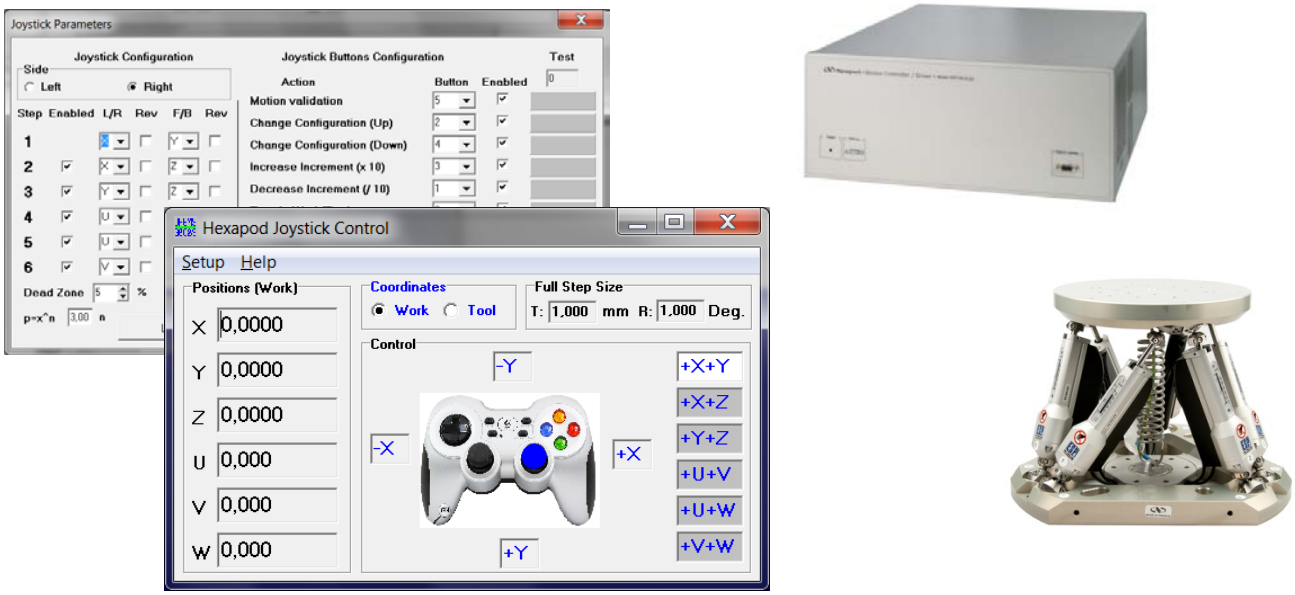
HXP-JOYSTICK

Joystick Control Software for Newport Hexapod HXP Controllers



Newport®

Experience | Solutions

User's Manual

V1.0.1

Precision Motion – *Guaranteed*™

Preface

Confidentiality & Proprietary Rights

Reservation of Title

The Newport Programs and all materials furnished or produced in connection with them ("Related Materials") contain trade secrets of Newport and are for use only in the manner expressly permitted. Newport claims and reserves all rights and benefits afforded under law in the Programs provided by Newport Corporation.

Newport shall retain full ownership of Intellectual Property Rights in and to all development, process, align or assembly technologies developed and other derivative work that may be developed by Newport. Customer shall not challenge, or cause any third party to challenge the rights of Newport.

Preservation of Secrecy and Confidentiality and Restrictions to Access

Customer shall protect the Newport Programs and Related Materials as trade secrets of Newport, and shall devote its best efforts to ensure that all its personnel protect the Newport Programs as trade secrets of Newport Corporation. Customer shall not at any time disclose Newport's trade secrets to any other person, firm, organization, or employee that does not need (consistent with Customer's right of use hereunder) to obtain access to the Newport Programs and Related Materials. These restrictions shall not apply to information (1) generally known to the public or obtainable from public sources; (2) readily apparent from the keyboard operations, visual display, or output reports of the Programs; (3) previously in the possession of Customer or subsequently developed or acquired without reliance on the Newport Programs; or (4) approved by Newport for release without restriction.

©2015 Newport Corporation
1791 Deere Ave.
Irvine, CA 92606, USA
(949) 863-3144

Table of Contents

Preface ii

1.0 Introduction 1
1.1 Introduction 1
1.2 Environment 1
1.3 Requirements 1
1.3.1 Computer 1
1.3.2 Motion Controller 1
1.3.3 Control Device 1
1.3.4 Software Installation 2
1.3.5 Connections 2

2.0 Software Description 3
2.1 Main Window Description 3
2.2 Main Menu Description 4
2.2.1 Setup 4
2.2.2 About 4
2.3 Joystick Parameters Window Description 5
2.3.1 Joystick Axes Configuration 5
2.3.2 Joystick Buttons Configuration 5
2.3.3 Test 6
2.3.4 Load & Save Configuration Buttons 6

3.0 Launching HXP_JOYSTICK 7
3.1 Verifying/Setting HXP Parameters 7
3.1.1 HXP Controller Group Name 7
3.1.2 Computer TCP/IP Address 7
3.1.3 HXP Address in HXP-JOYSTICK 8
3.1.4 HXP Move to Zero Position 9
3.2 Verifying Control Device Installation 10
3.3 Setting Joystick Parameters 10

4.0 Hardware Installation Verification 12
4.1 Windows Installation - Logitech Gamepad 12
4.1.1 Logitech Wireless Gamepad F710 12
4.2 Control Hardware Windows Installation Verification 13
4.2.1 Logitech Gamepad F170 Features 13

Service Form 15

Table of Figures

Figure 1: HXP_Joystick main window. 3
Figure 2: Joystick parameters window. 5
Figure 3: Gamepad windows installation verification 12
Figure 4: Gamepad example 13

HXP-JOYSTICK
Joystick Control Software for Newport Hexapod HXP Controllers

1.0 Introduction

1.1 Introduction

The **HXP-JOYSTICK** enables the use of a commercial Joystick on a hexapod system controlled by Newport HXP-ELEC Motion Controller.

HXP_JOYSTICK reads Joystick commands and converts them into HXP-ELEC controller commands. This includes repeated incremental moves to simulate analog control and axis selection.

NOTE

The Joystick must first be correctly installed in the Windows environment.

1.2 Environment

HXP_JOYSTICK works in Windows 7 and 8 (32 bits) operating environments.

1.3 Requirements

1.3.1 Computer

PC with 2 GB RAM and at least 20 MB free hard disk space, Windows 7 or 8.

1.3.2 Motion Controller

HXP_JOYSTICK software supports the Newport HXP-ELEC motion controller.

NOTE

HXP-ELEC controller must be configured with a group named "HEXAPOD". Refer to HXP-ELEC Controller User's Manual.

1.3.3 Control Device

HXP_JOYSTICK software supports any device correctly installed and recognized by Windows. However, it has been optimized for the use of "Logitech F710" wireless gamepad.

1.3.4 Software Installation

From a CD-ROM:

- Click Start on the Windows taskbar
- Select Run from the Start menu
- Click Browse and locate your CD or DVD-ROM drive to view the files available on the CD-ROM
- Copy the entire "**HXP_JOYSTICK"** folder and paste it on your hard-disk

NOTE

Make sure you have Administrator rights for the selected location.

1.3.5 Connections

Ethernet link: PC computer to Newport HXP-ELEC controller (Host).

HXP-MECA to HXP-ELEC controller: Consult the HXP-ELEC User's Manual.

2.0 Software Description

2.1 Main Window Description

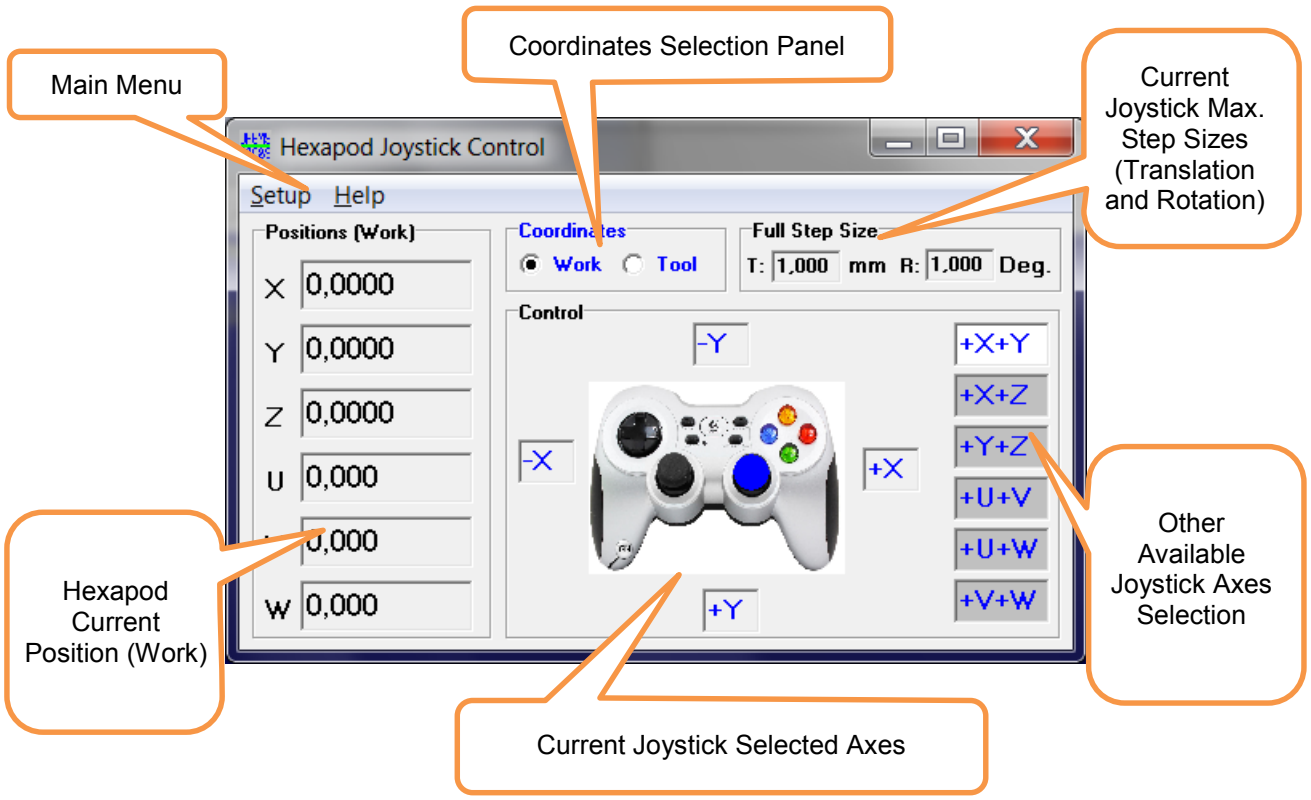


Figure 1: HXP_Joystick main window.

- **Main menu** allows setting parameters and displays software information.
- **Positions (Work)** panel displays the hexapod's current position in Work coordinates for all six axes (X, Y, Z, U, V, W).

NOTE

Background color in Position (Work) indicates the group status:

- **Red: Not initialized**
- **Yellow: Disabled**
- **Light gray: Idle**
- **Dark gray: Moving**

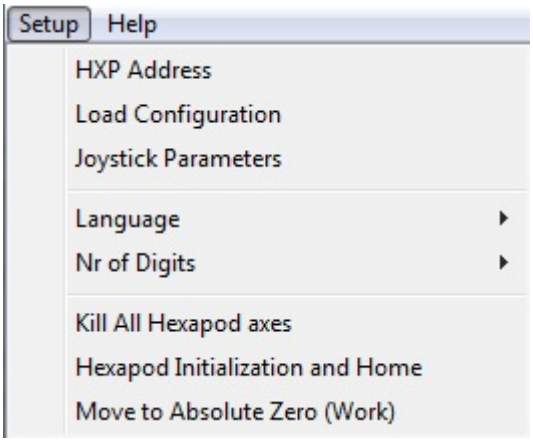
- **Coordinates** panel allows selecting the reference coordinates (Work or Tool) in which Joystick moves will be executed. This selection can also be done by a Joystick button: see Joystick Buttons Configuration of the Joystick Parameters Window.
- **Control** panel displays the current Joystick axes selected in the Joystick Axes Configuration of the Joystick Parameters Window.

NOTE

Selected Axes background color in Control turns purple whenever the HXP controller returns an error. For example, when a travel limit is reached.

2.2 Main Menu Description

2.2.1 Setup



- **Load Configuration**: to load a predefined configuration (HXP and Joystick parameters).
- **HXP Address**: to set HXP-ELEC TCP/IP address.
- **Joystick Parameters**: to select Axes, directions, increments, Buttons actions, etc.).
- **Language**: to select display language (French/English/Other).
- **Nr of Digits**: use for the number of digits of the **Translation** and **Rotation** axes positions which are displayed in the main window.
- **Kill All Hexapod Axes**: to kill all Hexapod axes. Stops motion and requires initialization.
- **Hexapod Initialization & Home**: to initialize and then Home the hexapod.
- **Move to Absolute Zero Position** (in Work coordinates).

2.2.2 About

- **About** provides Software information.

- **Manual** : Opens the HXP-Joystick User Manual (pdf).

2.3 Joystick Parameters Window Description

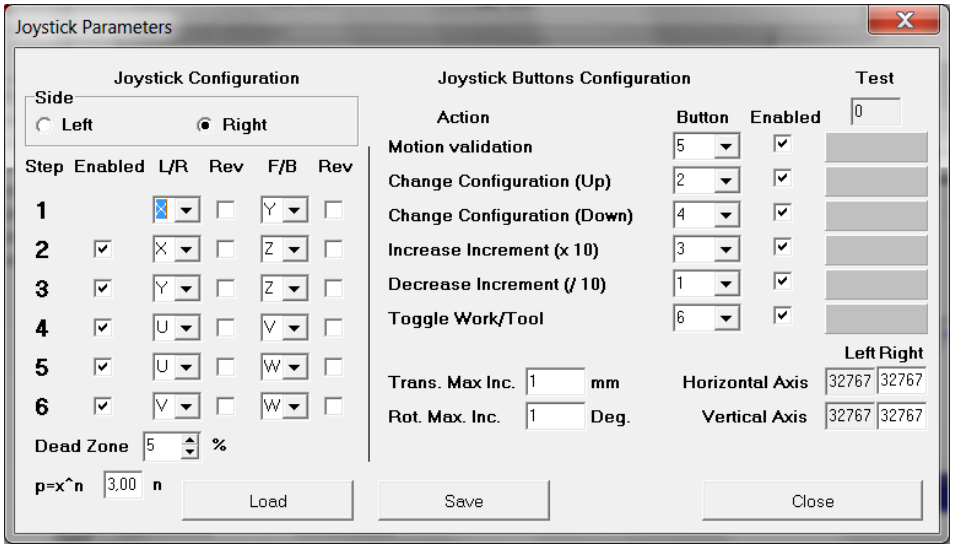


Figure 2: Joystick parameters window.

2.3.1 Joystick Axes Configuration

The left side of this window allows setting the following parameters:

- Joystick Left/Right selection: (only for control device with 2 joysticks).
- Joystick axes assignment: Up to 6 configurations can be set for the 2 axes of the stick control then two buttons allow incrementing/decrementing the configuration step. For each step, the following parameters can be set:
  - Enable/Disable the step
  - Axes for Left/Right and Front/Back control
  - Reverse each axis
- To avoid axis drift due to the joystick's analog output offset, a dead Zone can be set (in % of the full range).
- The increment size / stick value law can be set (Increment size = stick value ^{n}).

2.3.2 Joystick Buttons Configuration

Any of the first 8 joystick action buttons (1 to 8) or the Point Of View (PoV) button can be assigned to one of the HXP_Joystick 6 commands and then enabled.

- **Motion Validation**: When enabled, the corresponding joystick button must be kept pressed to allow motion through the joystick.
- **Change configuration Up and Down**: When enabled, pressing the corresponding button increments or decrements the Joystick configuration number. The control panel of the main window is updated accordingly.
- **Increase/Decrease Increment**: When enabled, pressing the corresponding button increases or decreases the **Translation and Rotation maximal Increments** by a factor of 10. Increment can be reduced 4 times. Full Step Size panel of the main window is updated accordingly.
- **Toggle Work/Tool:** When enabled, pressing the corresponding button toggles to the reference coordinates for the next joystick move.
- **Translation and Rotation maximal Increments** allow setting the size of the incremental move sent when the stick is pushed to its maximum position.

NOTE

- **Stick intermediate positions generate increment sizes following the increment size / stick position law defined above.**
- **In case of Game set in "mode 1" this increment size is used for the cross buttons (see Annexes). This size can be reduced using the Increment scale factor.**

- **Increment scale factor** (only for single joystick control device) allows setting the size of the incremental move sent when the stick is pushed to its maximal position by using the third analog control of this device.

2.3.3 Test

- A first indicator displays the value returned by the device. The returned value corresponds to sum of each button pressed using the formula: $V_N = 2^{N-1}$ where N is the button number.

Examples of returned values:

Button(s) pressed	Value
None	0
1	1
2	2
3	4
…	
5	16
…	
8 & 3	132

NOTE

Return value ranges from 0 to 64 for regular joystick (only 8 buttons) and from 0 to 4095 for regular joystick (16 buttons).

- Six **indicators** allow checking the selected joystick inputs (they turn red when button is pressed) and the **value** of the 4 analog controls are displayed (0 to 65535).

NOTE

During this test, no command is sent to the HXP controller.

2.3.4 Load & Save Configuration Buttons

Current Joystick parameters and HXP Address can be saved by pressing the **Save** button.

Previously saved configurations can be re-loaded by pressing the **Load** button.

NOTE

In case of different HXP IP address, HXP_Joystick must be closed and restarted.

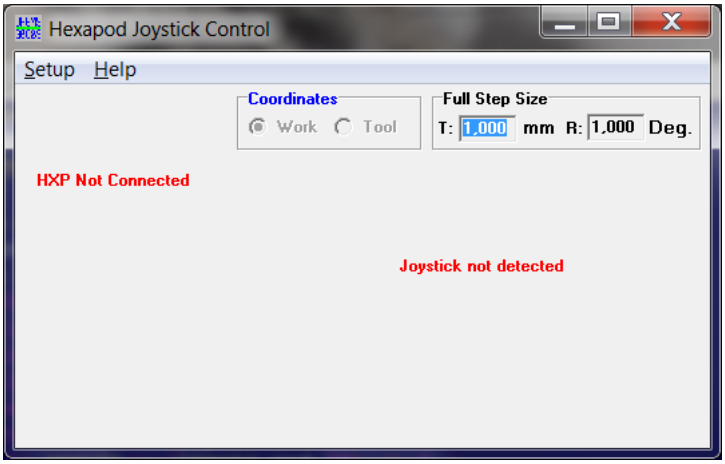
3.0 Launching HXP_JOYSTICK

Using HXP_JOYSTICK is very simple. However it requires two tasks to be performed before starting:

- HXP controller to be connected powered on and boot process completed.
- Control device to be connected and correctly installed in Windows environment.

Launch HXP_JOYSTICK and wait for communication to be established.

In the case of an incorrect TCP/IP address setting, HXP-JOYSTICK will not be able to communicate with the controller and the "**positions**" panel will be replaced by the Label "**HXP Not Connected**". See Verifying/Setting HXP Parameters chapter.



In the case of an incorrect setup, HXP-JOYSTICK will not be able to communicate with the control device and the "**Control**" panel will be replaced by the Label "**Joystick Not Detected**". See the next chapter.

If the TCP/IP address setting is correct, HXP-JOYSTICK will establish communication and first compare the communication library (HXP_Cx_drivers.dll) located in the HXP controller to the one located in the HXP_JOSTICK folder. If the Controller's dll is more recent, it'll be uploaded and used.

3.1 Verifying/Setting HXP Parameters

Using HXP_JOYSTICK on a Newport HXP controller for the first time requires verifying and or setting several parameters.

NOTE

These parameters must be set only once as it is memorized by HXP_JOYSTICK.

3.1.1 HXP Controller Group Name

- Verify that all axes in the HXP controller are set in a group named "HEXAPOD".

3.1.2 Computer TCP/IP Address

To establish communication with the HXP controller, the computer Ethernet TCP/IP address must be set correctly according to hardware communication configuration.

- Computer linked directly to HXP "Remote" port.

  In this case, a cross-over Ethernet cable must be used.

Computer TCP/IP address must be set at “192.168.254.X” (with X smaller than 254). Subnet mask must be set at “255.255.255.0”.

- Computer linked directly to HXP “Host” port.

  In this case, a cross-over Ethernet cable must be used.

  Computer TCP/IP address must be set at an address corresponding to HXP “Host” TCP address. (The first 3 sets of numbers must be the same, but the last one different. I.e.: “150.10.23.45” for HXP and “150.10.23.44” for computer).

  Subnet mask must be set to “255.255.255.255”.

NOTE

Consult HXP user’s manual for HXP “Host” port address setting.

- Computer linked to HXP “Host” port though a network.

  In this case, a straight through Ethernet cable must be used.

  Computer and HXP TCP/IP addresses must be set at different addresses compatible with the current network settings (consult your network administrator).

  Recommended Subnet mask setting is: “255.255.255.0”.

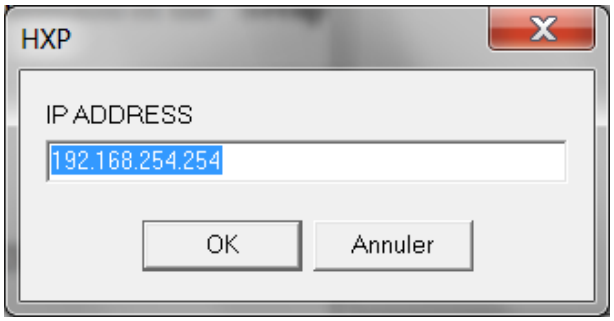
  If HXP IP address has already been set, **HXP_JOYSTICK** is ready to use and the main window is displayed. Joystick parameters can now be set through Setting joystick parameters.

  For the first use or in case of new IP address **HXP_JOYSTICK** will go through parameter settings described in chapter 3.1.2.

3.1.3 HXP Address in HXP-JOYSTICK

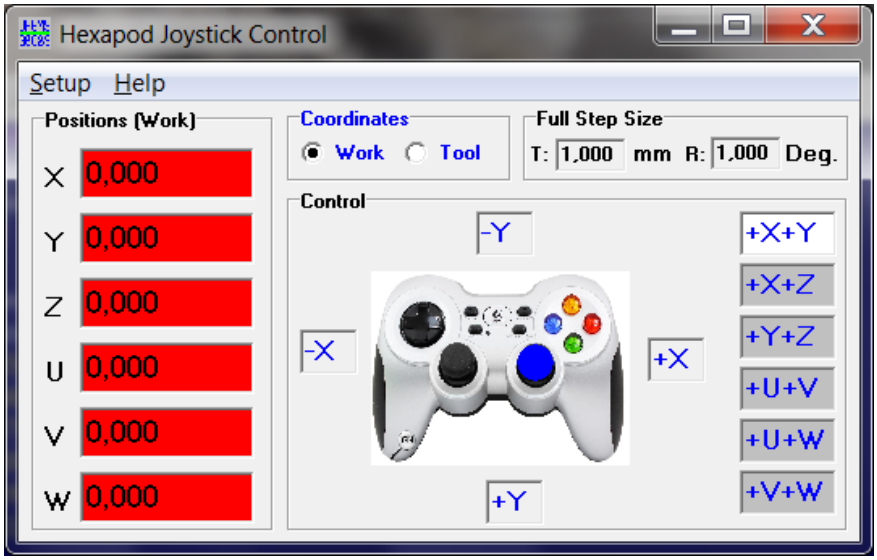
In the case of an incorrect TCP/IP address setting, HXP-JOYSTICK will not be able to communicate with the controller and the “position” panel will be replaced by the Label “**HXP Not Connected**” .

Select “**HXP Address**” command of the “**Setup**” menu and then enter the current HXP address.



Then exit and re-launch HXP-JOYSTICK software (to memorized parameters).

Once the HXP address has been set correctly and if Hexapod has not been initialized, the **HXP-JOYSTICK** main window displays the Hexapod position (in Work coordinates) as follows:



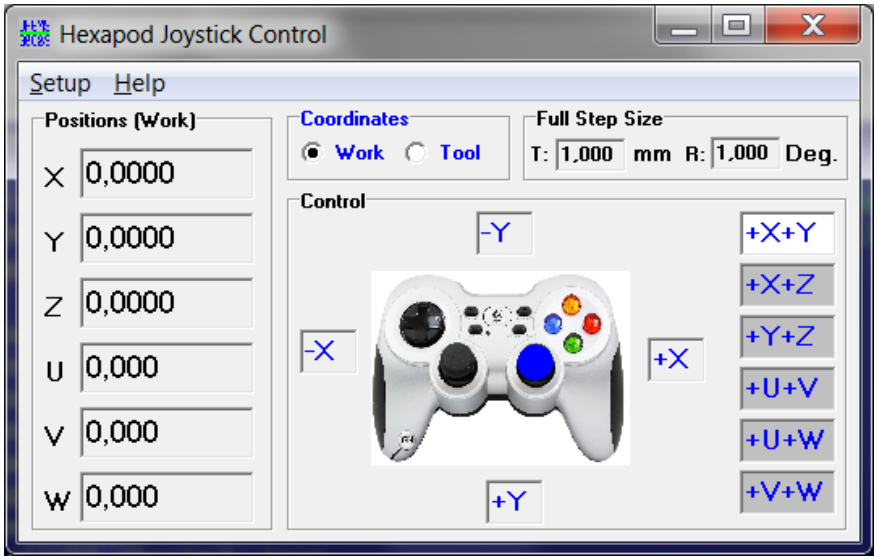
To be under joystick control, all 6 hexapod axes need to be initialized. If HXP axes are not initialized, HXP-JOYSTICK Positions background color turns red indicating the need for initialization which can be done by clicking on "**Initialization & Home**" in the main menu.

WARNING

Ensure that the hexapod can move freely, remove the shipping bracket, for example, before launching Initialization & Home.

3.1.4 HXP Move to Zero Position

Once all HXP actuators have been initialized and homed, it is recommended to move the Hexapod to its Zero position (in Work coordinates) by simply selecting the "**Move to Absolute Zero**" of the '**Setup'** menu.



NOTE

Hexapod axes can be killed through the "Kill All Hexapod Axes" of the 'Setup' menu.

3.2 Verifying Control Device Installation

- **Logitech F710 gamepad**

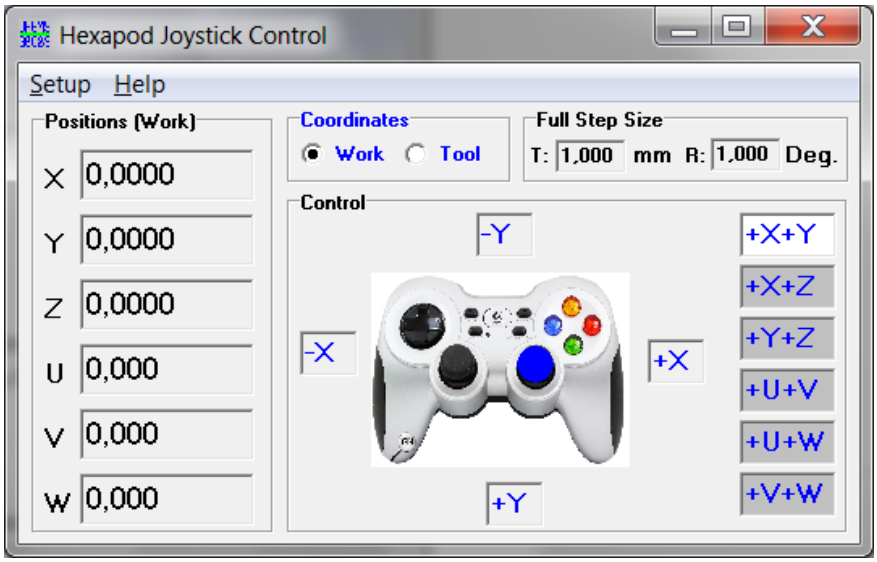
Follow Logitech instructions to install the necessary drivers for this device. See chapter 4.0 for details.

3.3 Setting Joystick Parameters

NOTE

Prior to launching HXP_JOYSTICK, the gamepad controller must have been installed correctly and recognized by Windows. See chapter 4.0 for details.

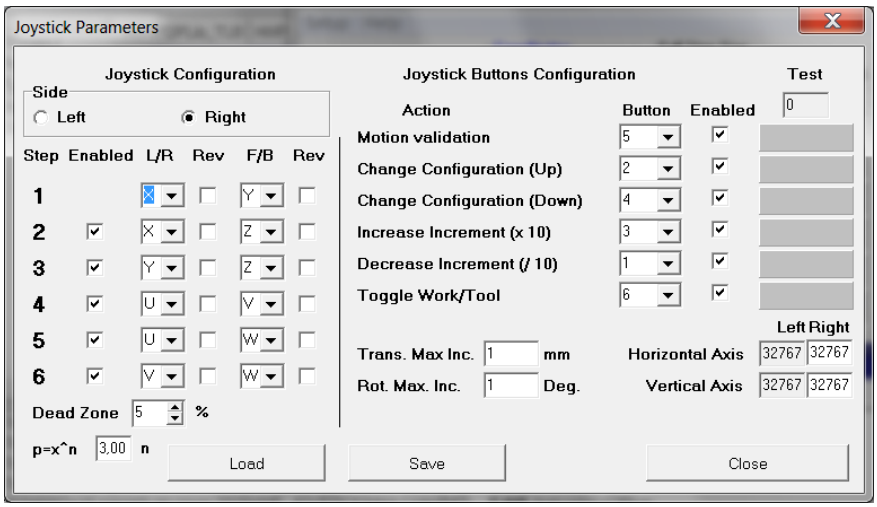
Once all parameters have been set correctly, the HXP-JOYSTICK main window displays the Hexapod position (in Work coordinates) as follows:



If the last saved configuration corresponds to the present needs, **HXP_JOYSTICK** is ready to use.

If another previously saved configuration is preferred, just select it through the menu: **Setup/ Load configuration**.

If a new configuration is required, set it through the menu: **Setup/Joystick Parameters**.



NOTE

Do not forget to Save the new configuration before closing the configuration window.

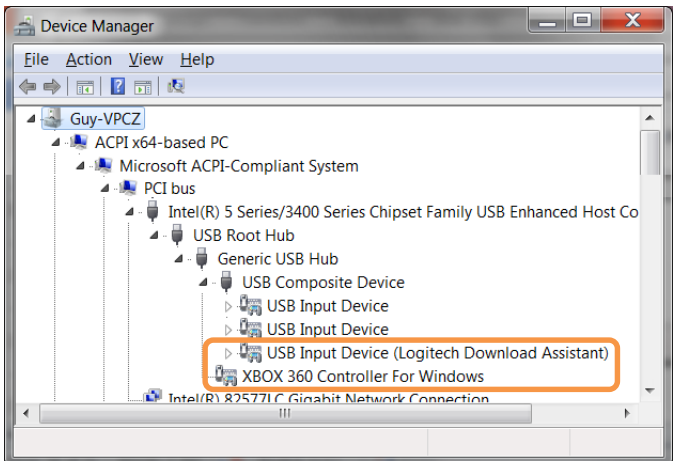
4.0 Hardware Installation Verification

4.1 Windows Installation - Logitech Gamepad

4.1.1 Logitech Wireless Gamepad F710

After installing the gamepad drivers and connecting it to one of the PC USB ports, open Windows Device Manager, select “View/Devices by connection” and verify that the gamepad is correctly installed. Example of windows 7 configuration:

View/Devices by connection



View/Devices by type

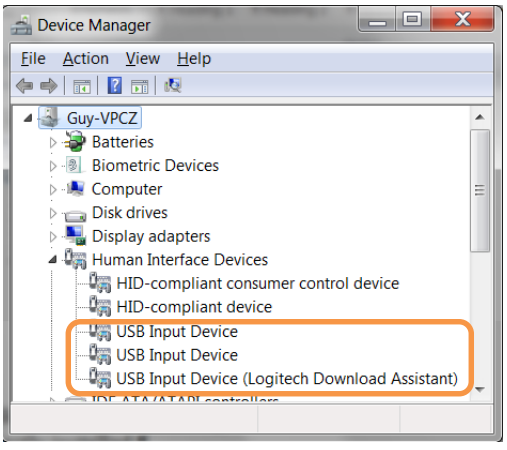


Figure 3: Gamepad windows installation verification.

4.2 Control Hardware Windows Installation Verification

4.2.1 Logitech Gamepad F170 Features

The gamepad includes up to 8 individual Action buttons, 1 “Point of View” 8-direction button, 2 joysticks (2 analog controls) and several mode control buttons.

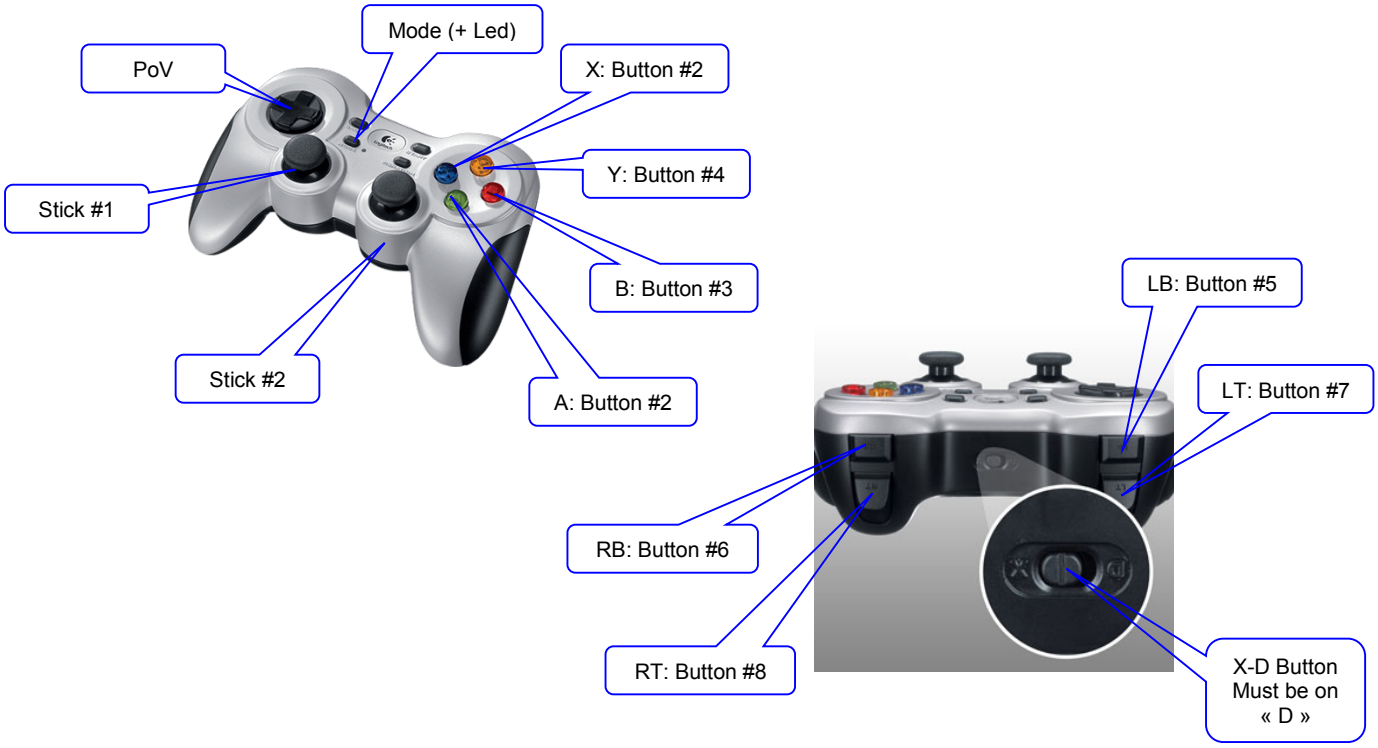


Figure 4: Gamepad example.

NOTES

- **Other buttons (Back, Start & Vibration): not used**
- **Back X-D button must be on “D”**
- **Mode Button:**
  - **LED Off: Stick 1 (analog 1 & 2) provides HXP analog control**
  - **LED On: PoV provide HXP (max) step by step motion**
- **After some time, the Gamepad turns itself off. Push “X” to reactivate**

Recommended HXP-JOYSTICK configuration for this Gamepad:

(For a right handed user)

- Right joystick
- Motion Validation: Button 5 (LB)
- Change configuration (Up): Button 4 (Y)
- Change configuration (Down): Button 2 (A)
- Increase Step size 3 (B)
- Decrease Step size 1 (X)
- Toggle Work/Tool: Button 6 (RB)

Service Form

Your Local Representative

Tel.: _____

Fax:_____

Name: _____

Company:_____

Address:_____

Country:_____

P.O. Number:_____

Item(s) Being Returned:_____

Model#: _____

Return authorization #: _____
(Please obtain prior to return of item)

Date: _____

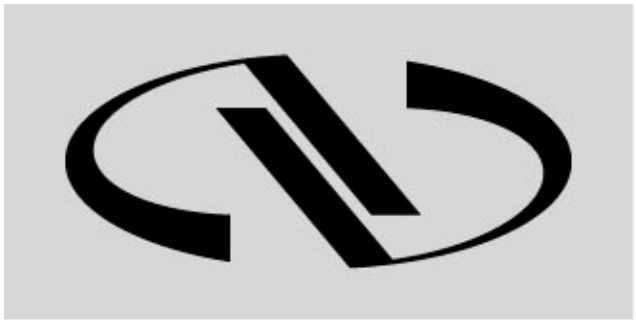
Phone Number: _____

Fax Number: _____

Serial #: _____

Description: _____

Reasons of return of goods (please list any specific problems): _____



Newport®

Experience | Solutions

Visit Newport Online at:
www.newport.com

North America & Asia
Newport Corporation
1791 Deere Ave.
Irvine, CA 92606, USA

Sales
Tel.: (800) 222-6440
e-mail: sales@newport.com

Technical Support
Tel.: (800) 222-6440
e-mail: tech@newport.com

Service, RMAs & Returns
Tel.: (800) 222-6440
e-mail: service@newport.com

Europe
MICRO-CONTROLE Spectra-Physics S.A.S
9, rue du Bois Sauvage
91055 Évry CEDEX
France

Sales
Tel.: +33 (0)1.60.91.68.68
e-mail: france@newport.com

Technical Support
e-mail: tech_europe@newport.com

Service & Returns
Tel.: +33 (0)2.38.40.51.55